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(54) Title of the Invention: OIL AND FAT FOR FRYING AND SPRAYING

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(57) Scope of the Patent's Claims

1 Oil and fat for frying and spraying, being a fatty acid composition comprising 55 ~ 70% of whole saturated fatty acids containing at least 45% of palmitic acid (weight standard, same as hereinafter), and 45 ~ 30% of unsaturated fatty acid;

and in addition, containing less than 2% of polyunsaturated fatty acids in addition to diene fatty acid, while containing essentially no transacids;

in oil and fat for frying and spraying comprising natural palm fractionated oil having a iodine value of less than 35 and a boiling point below 35EC.

2 The oil and fat for frying and spraying described in claim 1, characterized by the fact that the whole saturated fatty acids comprise 60 ~ 65% of unsaturated fatty acids and 40 ~ 35% of unsaturated fatty acids.

Detailed Explanation of the Invention

This invention relates to oil and fat for frying and spraying. Specifically, it relates to oil and fat for frying and spraying that does not have an oxidized flavor and that also has essentially no transacid content. In other words, it relates to oil and fat for frying and spraying that not only has an AOM value above 200 hours although it is a non-hardened oil, but that also has an optimal color tone and flavor.

Because one of the characteristics of oils and fats that were used in the past was that they had to be "tasty" (have a distinctive flavor), white root oil and similar liquids were used for this purpose. However, because liquid oils have generally unstable characteristics, and their approximate AOM value is in the range of 5 ~ 20 hours, the problem with products that were using such liquid oils was that they had very poor storage stability characteristics. On the other hand, while oils and fats based on laurin, such as coconut oil, can be used in particular as oils and fats for spraying because they display an optimal oxidation stability, because laurin-based oils and fats are easily susceptible to hydrolysis, the problem with these oils and fats is that the flavor of the resulting products can easily deteriorate. Moreover, so called highly stable oils and fats, for instance soybean oil, natane oil, cotton seed oil, or other liquid oils such as soft palm oil display a high oxidation stability, and they are easy to handle as well as suitable for frying and spraying as they have a low melting point. For example soybean oil, natane oil, cotton seed oil or other liquid oils or soft permanent oils are characterized by high isomerization hardening as well as solvent fractionation, as commercially available refined oils and fats containing low-melting point fractions. Although these hardened oils and fats processed by fractioning treatment reach an AOM value of more than 200 hours, a very high transacid content is created as a result of high

isomerization hardening. That is why theses oils were shunned as products having a low nutritional value. Moreover, because hardened oils generally have added hydrogen containing liquid oil having a high iodine value (IV), and because they have high hardening characteristics () IIV), the problem is that the taste is includes a hardening odor. In addition, because oil solvent fractionation results in fractions with a low melting point, another problem is that the color tone of acquires a deep, inferior color. Accordingly, oils and fats that would not suffer from the above described deficiencies, that would have an optimal AOM stability, and that would be at the same time easy to handle while having a low melting point with a high stability have been desirable for many years now.

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The inventors of this invention discovered as a result of intensive research aimed at an improvement of the above mentioned problem areas that specific palm fractionated oils obtained by fractionation of natural palm oils not only have no hardening odor, but also contain essentially no transacids. Specifically, regardless of the fact that these are non-hardening products, a high AOM value above 200 hours is reached. Moreover, they discovered an oil and fat composition comprising a natural fractionated palm oil suitable for frying or spraying that is easy to handle and that has a low melting point. Based on a perfection of the discovery of this invention, the inventors have discovered a fatty acid composition comprising 55 ~ 70 %, preferably 30 ~ 65% of whole saturated fatty acids containing at least 45% of palmitic acid (weight standard, same as hereinafter), and 45 ~ 30%, preferably 40 ~ 35% of unsaturated fatty acids. Moreover, the composition contains less than 2% of polyunsaturated fatty acids in addition to diene fatty acid, while containing essentially no transacids; in oil and fat for frying and spraying comprising natural palm fractionated oil having a iodine value of no more than 35, and a boiling point below 35EC, preferably less than 33EC.

It is known that in the past, palm oil was used as a cacao substitution raw material oil and fat, in particular as a common cacao substitution fat having fractions with a iodine value in the range of 30 ~ 37. However, there are no examples in prior art of palm fraction oils that would be used as a cacao substitution fat.

According to this invention, fractionated oil must be obtained with whole saturated fatty acids in the range of 55 ~ 70%, including at least 45% of palmitic acid in the fatty acid composition, not as fractions having a medium melting point obtained by fractionation of palm oil only, because although these fractions have good stability, they are not suitable for frying and spraying. If the content of the whole saturated fatty acids is less than the lower limit, the stability characteristics will be poor. If the upper limit is exceeded, the problem then is that the melting point will be high and the product will be perceived as having a waxy taste when it is used for frying or spraying, because the product will leave a bad taste in the mouth. To put it differently, in particular when the content of palmitic acid in the whole saturated fatty acids is less than 45%, a high content of stearic acid is created along with a high melting point and that is not desirable.

Further, the content of the diene fatty acid in the whole fatty acids must be no more than 2%. If this content is more than 2%, the stability characteristics will deteriorate. Therefore, the iodine value should be no more than 35, and the melting point (melting point when temperature is increased) should be no more than 35EC, while less than 33EC is preferable, of medium melting point fractions that have absolutely no hardening odor. Because the product is not only easy to handle as it has a low melting point, but moreover, since essentially no transacids are contained and an AOM value above 200 hours is achieved, oil for frying and spraying having superior characteristics is obtained. In addition, the AOM value can be measured in accordance with this invention based on to the A, O, C, S, Tentative Method Cd, 12 - 57, and the peroxide value (POV) is the time period until 100 meq/kg is attained.

As was explained above, because the oil and fat for frying and spraying of this invention has superior characteristics, it is particularly effective when used in potato chips, Japanese rice crackers [beika], instant Japanese noodles [ramen], and other products that can be stored for a long period of time (approximately 6 months). In particular, although there are highly stable oils and fats according to prior art with an AOM value above 200, since these products were necessarily hardening oils, generation of a hardening odor was under present conditions unavoidable. Moreover, while in the past it was also impossible to avoid a large amount of generated transacids with these conventional products, the oil and fat according to this invention not only has no hardening odor, but since there is no need to shun the fat an oil because it does not generate transacids or from the viewpoint of its nutritional value and an AOM value above 200 is achieved at the same time with high stability characteristics, this is an epoch-making kind of oil and fat. Furthermore, no unwanted coloring is acquired and since the product will melt in the mouth because it has a melting point below body temperature, the invention thus makes it possible to manufacture a product for frying that has a truly superior quality, a product that will be able to meet the requirements and demands of the manufacturing industry for many years to come.

The following explanation pertains to a manufacturing example using this invention, while the effect of the invention can be clearly seen from a comparison thereof to a comparative example and to a product according to prior art.

Manufacturing Example 1

1 part of palm oil having a iodine value of 52.3, (weight standard, same as hereinafter), was heated with and dissolved in 4 parts of n-hexane and after cooling to -20EC was performed and after the generated crystalline parts were filtered out, the parts of the filtrate containing parts with a low melting point were removed. Next, n-hexane was added to the crystalline parts so as to create a 20% oil fraction and after heating and dissolution, followed by cooling to 0EC, crystallizing parts with a high melting point were removed. In addition, the filtrate parts were cooled to -13EC and crystallizing crystalline parts were separated. After these crystalline parts were refined by removing the solvent, the target product was obtained. The composition is shown in Table 1.

Comparative Example 1

1 part of palm oil was heated with and dissolved in 4 parts of n-hexane in the same manner as in Manufacturing Example 1, and after cooling to 0EC was performed and after the generated crystalline parts were filtered out, the parts of the filtrate containing parts with a high melting point were removed. After that, the filtrate parts were cooled to -15EC, crystallizing crystalline parts were removed, and after refining was performed by removing the solvent, fractions having a medium melting point were obtained. The composition is shown in Table 1.

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As shown in Table 1, No. 1 and No. 2 indicate the status of fractions having a medium melting point in palm oil obtained in manufacturing Example 1 and Comparative Example 1. No. 3 ~ 6 are products according to prior art. In particular, No. 4 ~ 6 indicate examples of odorless cacao fat products produced as natural oils and fats that did not contain transacids and were free of a hardening odor, as well as of coconut oil- and cacao fat-specific odor. Moreover, because cacao fat is expensive, this is not a suitable fat or oil when used for frying or spraying from an economic viewpoint since this kind of use would not be practical.

Table 1

No.	Iodine Value (IV)	Melting Point (EC)	Whole Saturated Acids (%)	C16 Acid (%)	Unsaturated Acids Other Than Dienoic Acid	Transacids (%)	AOM Value* (Hours)	Remarks
1	33.4	31.7	62.4	53.6	1.9	Not detected	238	Obtained in Man. E. 1
2	37.8	33.5	62.5	55.2	4.0	Same as above	120	Obtained in Comp. E. 1
3	55.0	31.0	38.9	33.2	1.5	2.5	241	Soft palm hardened oil
4	8.2	24.1	91.9	9.0	1.7	Not detected	283	Refined coconut oil
5	35.6	32.7	61.5	26.2	2.2	Same as above	Above 300	Cacao fat
6	35.5	32.6	61.5	26.3	2.2	Same as above	165	Cacao fat product with removed odor

* With the exception of No. 5, the values were measured after refining and odor removal and after adding 25 ppm of citric acid and 100 ppm of vitamin E.

Usage Examples And Comparative Usage Examples

When the respective oils and fats shown in Table 1 were used, starch pellets thereof were observed under the conditions indicated below during the frying state and a flavor and preservation characteristics test was conducted (by removing one part).

Oil weight: 1 kg, so that the weight of the oil was reduced every 3 hours.
Frying speed: 1 frying cycle applied once per 10 minutes to 30 g of a starch pellet.

Status during frying:

Sample No. 1, obtained as a product of this invention in Manufacturing Example No. 1, was optimal, without occurrences of a hardening odor, soap odor, or crab bubbles or the like.

While sample No. 2, obtained as fractions of palm oil having a medium melting point in Comparative Example 1 did not have any particular deficiencies during frying, the sample did not represent the target oil or fat because it contained 4% of polyunsaturated fatty acids other than dienoic fatty acids and because it had a low AOM value of 120 hours.

Sample No. 3, which was a hardening oil wherein hydrogen was added to palm oil, displayed hardening odor during frying.

While sample No. 4, which was a coconut oil representing an oil and fat of the lauric type had a low melting point and an excellent AOM stability, it was not a suitable product because crab bubbles were generated in the sample during frying and soap odor was also perceptible.

Although sample No. 5, which was a natural cacao fat, was a type of oil and fat that displayed very good stability, because it contained a rubbery substance admixture as well as a protein substance or amino acid, a scorching odor was generated during frying. Because crab bubbles were also generated, it was not a suitable product.

While admixtures were removed from product No. 6, which was a natural cacao fat from which odor was removed by refining, the result was that its AOM stability was low, which is why it was not a suitable product for an oil or fat.

Based on the results above, samples No. 4 ~ 6 were eliminated as unsuitable products for an oil or fat for frying, and samples No. 1 ~ 3 were tested in a sensory test of the flavor of the samples by 10 panel members on the 9^{th} ~ 12^{th} hours of frying. The results obtained from the test are listed below.

Results of a Sensory Test by Panel Members

No.	Sample Oil	Results
1	The sample of Manufacturing Example 1	10 members of the panel determined that this sample had a light flavor suitable for a snacking product.
2	The sample of Comparative Example 1	9 out of 10 members of the panel arrived at the same kind of determination of good quality.
3	Sample of the soft palm hardening oil	All 10 members of the panel perceived a hardening odor and determined that this product was of inferior quality compared to sample No. 1.

Based on these results, the oil and fat of the present invention obtained in Manufacturing Example 1 (No. 1) was optimal for use as a frying product, and it had a much better taste than the used prior art example of hardening oil (No. 3).

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Next, when the starch pellets of the same items that were used for said sensory test were preserved in an oven at 60EC and the deterioration status of the oil and fat in the fry product was observed, it was determined as shown below that the increase in the peroxide value (POB) was lowest in the Manufacturing Example 1 according to the oil and fat of this invention, which also had optimal storage stability characteristics. On the other hand, the palm fraction oil and fat outside of the scope of the present invention in Comparative Example 1 (No. 2) had a high peroxide value and its storage stability characteristics were inferior.

Results of Oven Storage Tests of Starch Pellets for Frying at 60EC

No.	Sample Oil	0	14	28	35	42	(Number of Storage Days)
1	Manufacturing Ex. 1	5	6	9	10	11	
2	Comparative Ex. 1	5	7	13	22	40	(POV Value) meg/kg
3	Soft Palm Hardening Oil	5	5	7	8	9	